

DESCRIPTIONS OF THE IMMATURE STAGES OF  
*STOBAERA TRICARINATA* (SAY)  
(HEMIPTERA-HOMOPTERA: DELPHACIDAE)

NEIL J. REIMER AND RICHARD D. GOEDEN<sup>1</sup>

Department of Entomology, University of California, Riverside 92521

---

Kramer (1973) revised the genus *Stobaera* based in part on specimens of 4 species, including *S. tricarinata*, collected from southern California ragweeds by Goeden and Ricker (1974a, 1974b, 1975, 1976a, 1976b, 1976c). No immature stages of Nearctic Delphacidae apparently heretofore have been described. The eggs and nymphs of *S. tricarinata*, the most widely encountered member of this genus in North America (Kramer, 1973), collected from western ragweed, *Ambrosia psilostachya* Decandolle (Compositae), herein are described using terminology from Hassen (1939) and Vilbaste (1968).

*Egg* (Fig. 1A).—Smooth, fusiform-ellipsoidal, slightly curved along its long axis, initially white, becoming hyaline with age. Mean lengths and widths ( $\pm$ S.D.) of 32 eggs were  $0.80 \pm 0.03$  mm and  $0.21 \pm 0.02$  mm, respectively.

*Nymphs* (Fig. 1).—Measurements of 11, 12, 12, 17, and 14 first–fifth instars, respectively, yielded the following averages: body length (excluding appendages),  $0.80 \pm 0.10$  mm,  $0.98 \pm 0.14$  mm,  $1.25 \pm 0.19$  mm,  $1.64 \pm 0.17$  mm, and  $2.44 \pm 0.24$  mm, respectively; antenna length (including apical seta),  $0.33 \pm 0.03$  mm,  $0.35 \pm 0.08$  mm,  $0.44 \pm 0.06$  mm,  $0.61 \pm 0.07$  mm, and  $0.86 \pm 0.05$  mm, respectively; and maximum head width,  $0.22 \pm 0.04$  mm,  $0.26 \pm 0.03$  mm,  $0.36 \pm 0.05$  mm,  $0.49 \pm 0.03$  mm, and  $0.67 \pm 0.04$  mm, respectively.

*First instar* (Fig. 1B).—Opaque white, with beige mottling on abdominal segments 2 and 5; eyes red; tarsal claws black; abdominal segments 6, 7, and 8, light orange.

Antenna with small, plate-like scape rising in genal region; pedicel cylindrical, comprising most of antenna; flagellum hemispherical, ca. half pedicel length and with a long, setaceous bristle extending from apex.

Vertex and frons with carinae; median carinae parallel from vertex to frons, gradually diverging laterally to post-clypeus; thus, interfrons narrower than laterofrons.

Wing pads and thorax without carinae; hind tibia without teeth or spur.

*Second instar* (Fig. 1C).—Nearly all white, with beige mottling on abdominal segments 3, 4, and 5. Antenna with flagellum and pedicel light

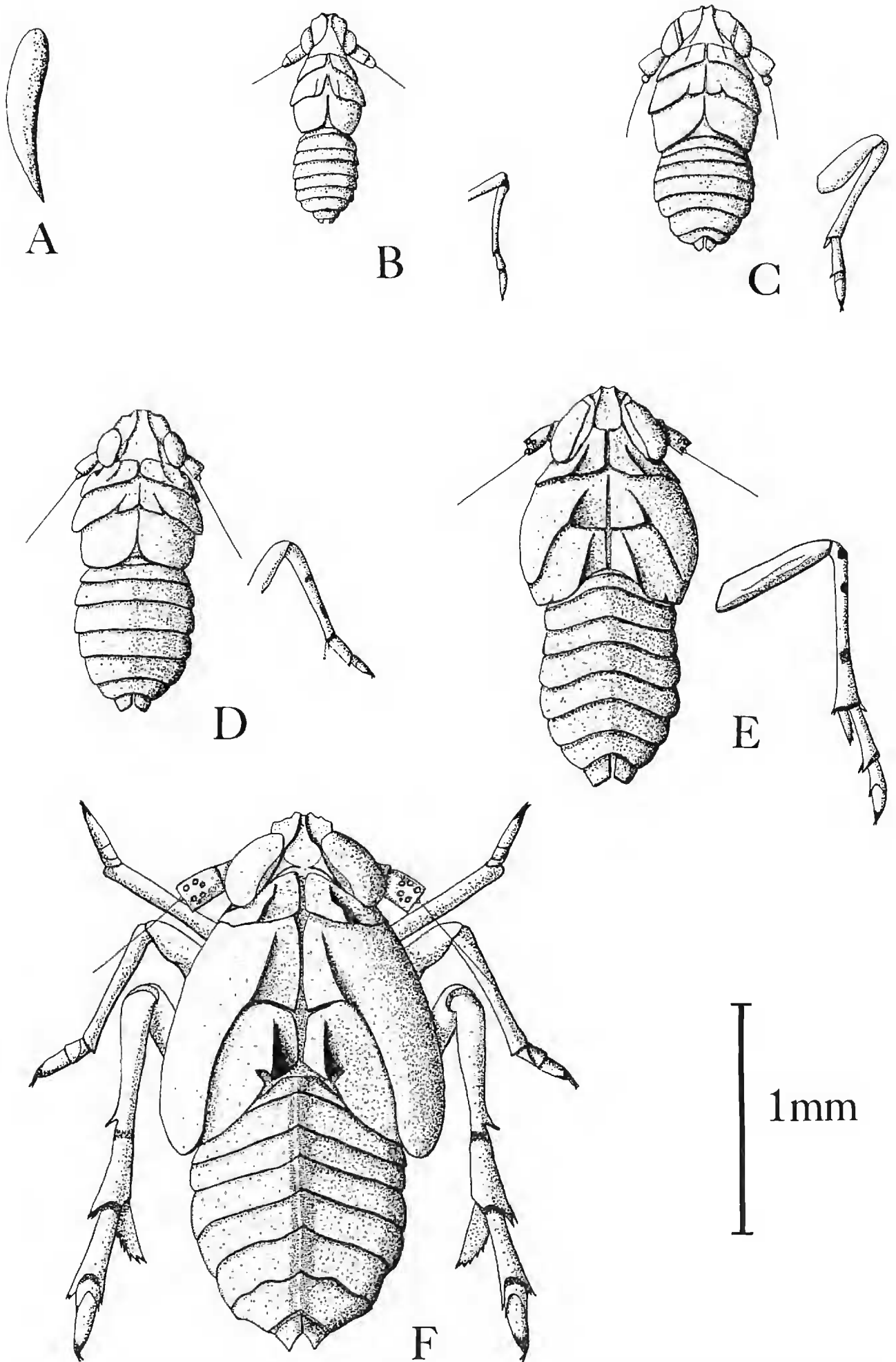


Fig. 1. Immature stages of *Stobaera tricarinata*. A. egg, B. first instar, C. second instar, D. third instar, E. fourth instar, F. fifth instar.

brown; flagellum reduced to small knob at pedicel apex. Compound eyes with dark red facets; each facet ringed with white, imparting a pinkish eye color.

Hind tibia with distal spur on calcar; calcar smooth, pointed distally, and  $0.04 \pm 0.01$  mm (N = 12) long. Wing pads present,  $0.16 \pm 0.02$  mm long.

*Third instar* (Fig. 1D).—Body mostly white, with light brown, slightly more pronounced, medial and lateral carinae on head. Mesonotal wing pad  $0.33 \pm 0.04$  mm long, smooth, with light brown distal third; metanotal pad, with light brown, rectangular marking on mesal half.

Hind tibia with 2 small teeth, 1 each on mid-anterior and distal end; calcar  $0.10 \pm 0.01$  mm long, with 2 distinct teeth on inner margin; tibia with light brown, annular markings at  $\frac{1}{3}$  and  $\frac{2}{3}$  its length.

*Fourth instar* (Fig. 1E).—Body coloration like third instar, but with white compound eyes surrounded by membranous areas. Antenna in groove on ventral part of eye; scape enlarged and cylindrical; flagellum very much reduced, but still with long, setaceous bristle.

Mesonotal wing pads  $0.60 \pm 0.05$  (N = 17) mm long; metanotal pads, only slightly elongated. Mesonotum and metanotum with pair of longitudinal carinae lateral to meson; longitudinal carina also laterad on pronotum.

Calcar  $0.15 \pm 0.01$  mm long (N = 17), with row of teeth along inner edge.

*Fifth instar*.—Sensory pits present on many parts of the body were only studied in fifth instar *S. tricarinata* (Figs. 1F, 2) but also occur in the other instars. Vilbaste (1968) stated that the number and arrangement of these pits in delphacid nymphs is constant in all but the first instar. On the head of *S. tricarinata*, these pits are limited to the lateral frons and vertex, 9 pits to each side of the median carinae (Fig. 2A). The European delphacids that Vilbaste (1968) studied also had 9 pits to each side of the median carinae, but these were arranged in 3 pairs on the laterofrons, 1 pit near the lateral keel and vertex, and another pair on the vertex near the medial keel. In *S. tricarinata*, the pits are unpaired and alternately placed along the length of the lateral and medial carinae from the vertex to the anteclypeus (Fig. 2A). The upper pit is always located nearest the lateral carina of the vertex. The remaining 8 pits are located on the laterofrons. Another pair of pits lie dorsal to the anteclypeus and lateral to the medial carina.

Pronotum with 2 lateral carinae, each carina with 3 pits, 2 medial to keel, and a caudal pit laterad to keel; pronotum with 2 additional pits at posterior base of each eye (Fig. 2B).

Mesonotal wing pads,  $1.09 \pm 0.10$  mm (N = 17) long, covering metanotal pads; wing pads with carinae well developed, a pair of pits on opposite sides of carinae, 1 mesal, 1 lateral, and 3 more pits laterad to these: 1 near outer edge of mesonotal pad, the other 2 pits in center of pad ca.  $\frac{2}{3}$  distance from pronotum to distal end of pad (Fig. 2B).

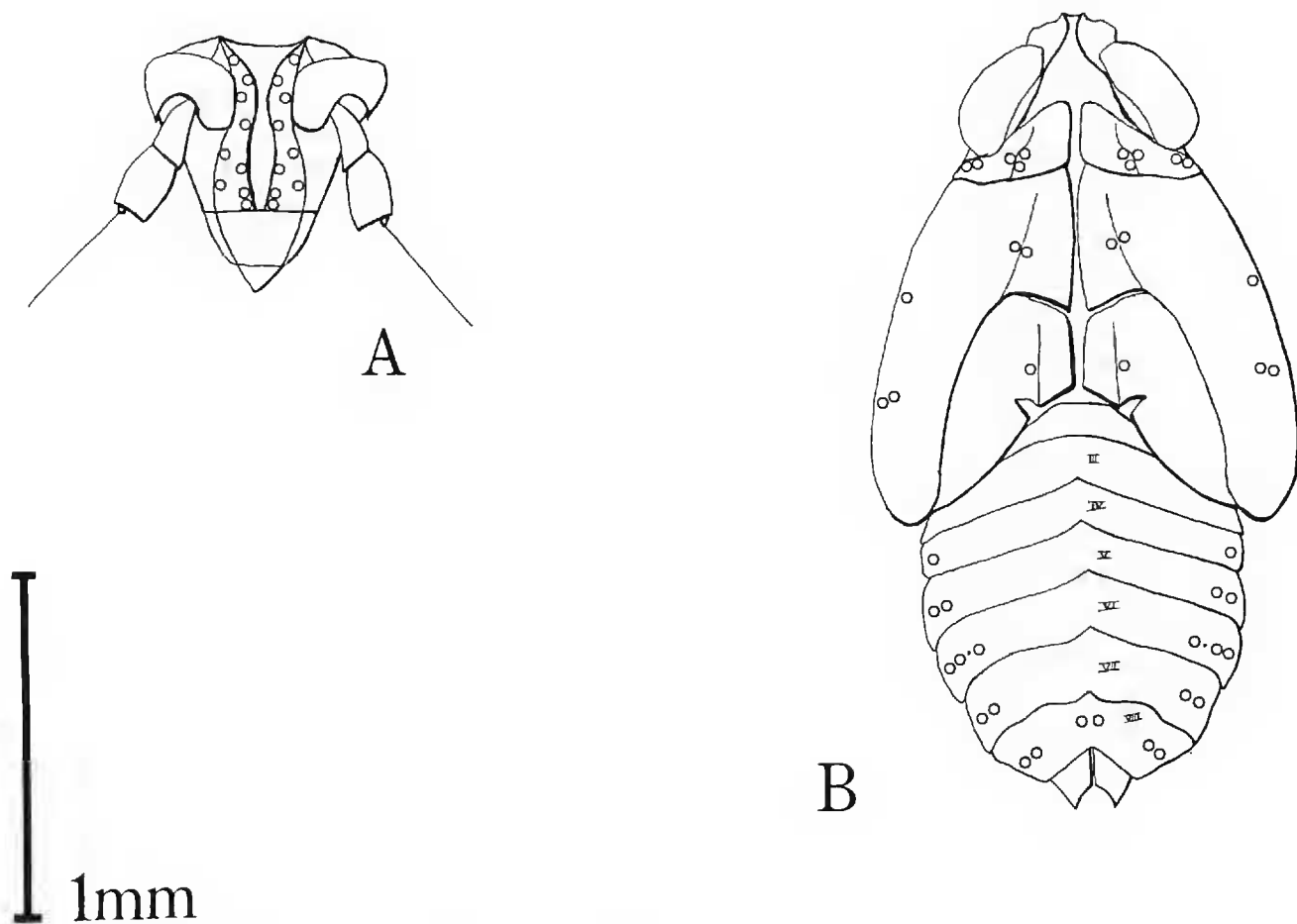


Fig. 2. A. location of sensory pits on the head of a fifth instar *Stobaera tricarinata*. B. location of sensory pits on the dorsum of this instar.

Metanotal wing pads reach abdominal segment 3; marginal slit present just behind medial ridge; sensory pit laterad to medial ridge (Fig. 2B).

Legs mostly white, with 3 dark brown annular markings on each tibia; calcar  $0.27 \pm 0.03$  mm (N = 14) long, with row of teeth on inner edge (Fig. 2E).

Abdomen with 9 apparent segments; sensory pits on terga 4–9 (Fig. 2B): terga 4 and 9 with 0 + 1 pits (number of medial pits + number of lateral pits; after Vilbaste, 1968) laterally, terga 5 and 7 with 0 + 2 pits, terga 6 and 8 with 1 + 2 pits; ridge on dorsum along meson. Abdomen, like rest of body, mottled dark brown and white.

#### Literature Cited

- Goeden, R. D., and D. W. Ricker. 1974a. The phytophagous insect fauna of the ragweed, *Ambrosia acanthicarpa*, in southern California. *Environ. Entomol.*, 3:827–834.
- Goeden, R. D., and D. W. Ricker. 1974b. The phytophagous insect fauna of the ragweed, *Ambrosia chamissonis*, in southern California. *Environ. Entomol.*, 3:835–839.
- Goeden, R. D., and D. W. Ricker. 1975. The phytophagous insect fauna of the ragweed, *Ambrosia confertiflora*, in southern California. *Environ. Entomol.*, 4:301–306.
- Goeden, R. D., and D. W. Ricker. 1976a. The phytophagous insect fauna of the ragweed, *Ambrosia dumosa*, in southern California. *Environ. Entomol.*, 5:45–50.

- Goeden, R. D., and D. W. Ricker. 1976b. The phytophagous insect fauna of the ragweeds, *Ambrosia chenopodiifolia*, *A. eriocentra*, and *A. ilicifolia*, in southern California. Environ. Entomol., 5:923-930.
- Goeden, R. D., and D. W. Ricker. 1976c. The phytophagous insect fauna of the ragweed, *Ambrosia psilostachya*, in southern California. Environ. Entomol., 5:1169-1177.
- Hassen, A. I. 1939. The biology of some British Delphacidae (Homoptera) and their parasites with special reference to the Strepsiptera. Trans. R. Entomol. Soc. Lond., 89:345-383.
- Kramer, J. P. 1973. Revision of the American planthoppers of the genus *Stobaera* (Homoptera:Delphacidae) with new distributional data and host plant records. Proc. Entomol. Soc. Wash., 75:379-402.
- Vilbaste, J. 1968. Preliminary key for the identification of the nymphs of North European Homoptera Cicadina. Ann. Entomol. Fenn., 34:65-74.

### Footnote

<sup>1</sup> Research Assistant and Professor, respectively. From a thesis submitted in partial satisfaction of the requirements for a M.S. degree in Entomology, University of California, Riverside.